

## FINAL REGULATION ORDER, PART 1

Note: Amendments to the regulations are shown with underline text for additions and ~~strikeout text for deletions~~. Newly adopted regulations are shown without underline as permitted by California Code of Regulations, title 1, section 8. Subsection headings are shown in italics and should be italicized in Barclays California Code of Regulations.

Amend California Code of Regulations, title 13, sections 2430, 2431, 2433, 2434, and 2438 to read:

### **Article 4.5. Off-Road Large Spark-Ignition Engines**

#### **§ 2430. Applicability.**

(a) (1) This article applies to large off-road spark-ignition engines 25 horsepower and greater produced on or after January 1, 2001 and all equipment and vehicles produced on or after January 1, 2001 that use such engines. Beginning January 1, 2007, this article applies to large off-road spark-ignition engines above 19 kilowatt (kW) and all equipment and vehicles that use such engines.

(2) Every new off-road large spark-ignition (LSI) engine that is manufactured for sale, sold, or offered for sale in California, or that is introduced, delivered or imported into California for introduction into commerce and that is subject to any of the standards prescribed in this article and documents incorporated by reference therein, must be certified for use and sale by the manufacturer through the Air Resources Board and covered by an Executive Order, issued pursuant to Chapter 9, Article 4.5, Section 2433.

(3) This article does not apply to engines in vehicles that are subject to requirements of Title 13, California Code of Regulations, Chapter 9, Article 3, Off-Highway Recreational Vehicles and Engines, including any related provisions and guidelines that are applicable to Off-Highway Recreational Vehicles and Engines.

(b) Each part of this article is severable, and in the event that any part of this chapter or article is held to be invalid, the remainder of the article remains in full force and effect.

(c) This article and documents incorporated by reference herein include provisions for emissions certification, labeling requirements, warranty, in-use compliance testing, and production line testing.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153, 43154, 43205.5, and 43210, 43210.5, 43211 and 43212, Health and Safety Code.

## § 2431. Definitions.

### DEFINITIONS

(a) The definitions in Section 1900 (b), Chapter 1, Title 13 of the California Code of Regulations apply to this Article with the following additions:

(1) to (18) [No Change]

(19) “Family Emission Level or FEL” means an emission level that is declared by the manufacturer to serve for the averaging, banking, and trading program and in lieu of an emission standard for certification. The FEL serves as the engine family’s emission standard for emissions compliance efforts. If the manufacturer does not declare an FEL for an engine family, the applicable emissions standard must be treated as that engine family’s FEL for the purposes of any provision of this Article. The FEL must be expressed to the same number of decimal places as the applicable emission standard.

~~(1920)~~ [No Change]

~~(2021)~~ [No Change]

~~(2122)~~ [No Change]

~~(2223)~~ [No Change]

~~(2324)~~ [No Change]

~~(2425)~~ [No Change]

~~(2526)~~ [No Change]

~~(2627)~~ [No Change]

~~(2728)~~ “Off-Road Large Spark-ignition Engines” or “LSI Engines” means any engine that produces a gross horsepower 25 and greater horsepower or is designed (e.g., through fueling, engine calibrations, valve timing, engine speed modifications, etc.) to produce 25 and greater horsepower (greater than 19 kilowatts on or after January 1, 2007). If an engine family has models at or above 25 horsepower and models below 25 horsepower, only the models at or above 25 horsepower (greater than 19 kilowatts on or after January 1, 2007) would be considered LSI engines. The engine’s operating characteristics are significantly similar to the theoretical Otto combustion cycle with the engine’s primary means of controlling power output being to limit the amount of air that is throttled into the combustion chamber of the engine. LSI engines or alternate fuel powered LSI internal combustion engines are designed for powering, but not limited to powering, forklift trucks, sweepers, generators, and

industrial equipment and other miscellaneous applications. All engines and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act, as amended, and as defined by regulation of the Environmental Protection Agency, are specifically excluded from this category.

Specifically excluded from this category are: 1) engines operated on or in any device used exclusively upon stationary rails or tracks; 2) engines used to propel marine vessels; 3) internal combustion engines attached to a foundation at a location for at least 12 months; 4) off-road recreational vehicles and snowmobiles; and 5) stationary or transportable gas turbines for power generation.

(~~28~~29) [No Change]

(~~29~~30) [No Change]

(~~30~~31) [No Change]

(~~31~~32) [No Change]

(~~32~~33) [No Change}

(~~33~~34) [No Change]

(~~34~~35) [No Change]

(~~35~~36) [No Change]

(~~36~~37) [No Change]

(~~37~~38) [No Change]

(~~38~~39) [No Change]

(~~39~~40) [No Change]

(~~40~~41) [No Change]

(~~41~~42) [No Change]

(~~42~~43) [No Change]

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153, 43154, 43205.5, and 43210, 43210.5, 43211 and 43212, Health and Safety Code.

### § 2433. Exhaust Emission Standards and Test Procedures - Off-Road Large Spark-Ignition Engines.

(a) This section applies to new off-road large spark-ignition engines produced on or after January 1, 2001. For the purpose of this section, these engines are also referred to as “new off-road LSI engines.”

(b) Standards.

(1)(A) Exhaust Emission Standards. Exhaust emissions from off-road large spark-ignition engines manufactured for sale, sold, or offered for sale in California, or that are introduced, delivered or imported into California for introduction into commerce, must not exceed:

Exhaust Emission Standards  
(grams per brake horsepower-hour)  
[grams per kilowatt-hour]<sup>(1)</sup>

<i>Model Year</i>	<i>Engine Displacement</i>	<i>Durability Period</i>	<i>HC + NOx</i>	<i>Carbon Monoxide</i>
2002 and subsequent	≤1.0 liter	1,000 hours or 2 years	9.0 [12.0]	410 [549]
2001 - 2003 <sup>(2),(3)</sup>	> 1.0 liter	N/A	3.0 [4.0]	37.0 [49.6]
2004 - 2006 <sup>(4)</sup>	> 1.0 liter	3500 hours or 5 years	3.0 [4.0]	37.0 [49.6]
2007 and subsequent - 2009	> 1.0 liter	5000 hours or 7 years	<del>3.0</del> <u>2.0</u> <del>[4.0]</del> <u>[2.7]</u>	<del>37.0</del> <u>3.3</u> <del>[49.6]</del> <u>[4.4]</u>
<u>2010 and subsequent</u> <sup>(5),(6)</sup>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.6</u> <u>[0.8]</u>	<u>15.4</u> <u>[20.6]</u>

- Note: (1) For 2006 and previous model years, sStandards in grams per kilowatt-hour are given only as a reference. For 2007 and subsequent model years, pPollutant emissions reported to ARB by manufacturers must be in grams per kilowatt-hourbrake horsepower-hour.
- (2) Small volume manufacturers are not required to comply with these emission standards.
- (3) Manufacturers must show that at least 25 percent of its California engine sales comply with the standards in 2001, 50 percent in 2002, and 75 percent in 2003.

- (4) The standards for in-use compliance for engine families certified to the standards in the row noted are 4.0 g/bhp-hr (5.4 g/kW-hr) hydrocarbon plus oxides of nitrogen and 50.0 g/bhp-hr (67.0 g/kW-hr) carbon monoxide, with a useful life of 5000 hours or 7 years. In-use averaging, banking, and trading credits may be generated for engines tested in compliance with these in-use compliance standards. If the in-use compliance level is above 3.0 but does not exceed 4.0 g/bhp-hr hydrocarbon plus oxides of nitrogen or is above 37.0 but does not exceed 50.0 g/bhp-hr carbon monoxide, and based on a review of information derived from a statistically valid and representative sample of engines, the Executive Officer determines that a substantial percentage of any class or category of such engines exhibits within the warranty periods noted in Section 2435, an identifiable, systematic defect in a component listed in that section, which causes a significant increase in emissions above those exhibited by engines free of such defects and of the same class or category and having the same period of use and hours, then the Executive Officer may invoke the enforcement authority under Section 2439, Title 13, California Code of regulations to require remedial action by the engine manufacturer. Such remedial action is limited to owner notification and repair or replacement of defective components, without regard to the requirements set forth in Section 2439(b)(5) or Section 2439(c)(5)(B)(vi). As used in the section, the term "defect" does not include failures that are the result of abuse, neglect, or improper maintenance.
- (5) For severe-duty engines, the HC+NOx standard is 2.7 g/kW-hr and the CO standard is 130.0 g/kW-hr.
- (6) Small volume manufacturers are required to comply with these emission standards in 2013.

(B) For the 2007 through 2009 model years, you may alternatively certify your engines according to the following formula instead of the standards in paragraph (b)(1)(A) of this section:

$$\underline{(HC+NOx) \times CO^{0.784} \leq 8.57.}$$

Where: HC + NOx = hydrocarbon plus oxides of nitrogen family emissions level (FEL) in g/kW-hr  
CO = carbon monoxide FEL in g/kW-hr

The HC+NOx and CO emission levels selected to satisfy this formula, rounded to the nearest 0.1 g/kW-hr, become the emission standards that apply for those engines. You may not select an HC+NOx FEL higher than 2.7 g/kW-hr or a CO FEL higher than 20.6 g/kW-hr.

(C) *Field Testing Standards.* The field testing standards for model year 2007 and subsequent off-road large spark-ignition engines are described in subpart F, Title 40 CFR Sections 1048.101(c), as adopted July 13, 2005.

(2)(A) *Optional Exhaust Emission Standards.* Manufacturers may certify off-road large spark-ignition engines manufactured for sale, sold, or offered for sale in California, or that are introduced, delivered or imported into California for introduction into commerce to the following optional low emission standards.

Optional Exhaust Emission Standards  
(grams per brake horsepower-hour)  
[grams per kilowatt-hour]<sup>(1)</sup>

<u>Model Year</u>	<u>Engine Displacement</u>	<u>Durability Period</u>	<u>HC+NOx</u>	<u>Carbon Monoxide</u>
<u>2007 - 2009</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>1.5</u> <u>[2.0]</u>	<u>4.8</u> <u>[6.4]</u>
<u>2007 - 2009</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>1.0</u> <u>[1.3]</u>	<u>8.3</u> <u>[11.1]</u>
<u>2007 - 2009</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.6</u> <u>[0.8]</u>	<u>15.4</u> <u>[20.6]</u>
<u>2007 - 2009</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.4</u> <u>[0.5]</u>	<u>15.4</u> <u>[20.6]</u>
<u>2007 - 2009</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.2</u> <u>[0.3]</u>	<u>15.4</u> <u>[20.6]</u>
<u>2007 - 2009</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.1</u> <u>[0.1]</u>	<u>15.4</u> <u>[20.6]</u>
<u>2010 and subsequent</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.4</u> <u>[0.5]</u>	<u>15.4</u> <u>[20.6]</u>
<u>2010 and subsequent</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.2</u> <u>[0.3]</u>	<u>15.4</u> <u>[20.6]</u>
<u>2010 and subsequent</u>	<u>&gt; 1.0 liter</u>	<u>5000 hours or 7 years</u>	<u>0.1</u> <u>[0.1]</u>	<u>15.4</u> <u>[20.6]</u>

Note: (1) Pollutant emissions reported to ARB by manufacturers must be in grams per kilowatt-hour.

(B) Field Testing Standards. The field testing standards for optional emission standard off-road large spark-ignition engines shall be 140 percent of the corresponding OLES HC+NO<sub>x</sub> standard and 150 percent of the corresponding OLES CO standard, rounded to the nearest tenth of one gram, using the field testing procedures described in subpart F, Title 40 CFR Section 1048.101(c), as adopted July 13, 2005.

(23) Crankcase Emissions. No crankcase emissions shall be discharged into the ambient atmosphere from any new 2001 or later model year off-road LSI engines.

(4) Evaporative Emission Standards. Starting in the 2007 model year, engines over one liter that run on a volatile liquid fuel (such as gasoline), must meet the following evaporative emissions standards and requirements:

(A) Evaporative hydrocarbon emissions may not exceed 0.2 grams per gallon of fuel tank capacity when measured with the test procedures for evaporative emissions as described in subpart F, Title 40 Code of Federal Regulations (CFR) Sec.1048, as adopted July 13, 2005.

(B) For nonmetallic fuel lines, you must specify and use products that meet the Category 1 specifications in SAE J2260 (issued November 1996).

(C) Liquid fuel in the fuel tank may not reach boiling during continuous engine operation in the final installation at an ambient temperature of 30° C. Note that gasoline with a Reid vapor pressure of 62 kPa (9 psi) begins to boil at about 53° C.

(D) Design-based certification as described in subpart F, Title 40 CFR Sections 1048.105 and 1048.245, as adopted July 13, 2005, may be used instead of generating new emission data.

(c) Test Procedures. The test procedures for determining certification and compliance with the standards for exhaust emissions from new model year 2001 through 2006 off-road LSI engines with engine displacement greater than 1.0 liter sold in the state are set forth in "California Exhaust Emission Standards and Test Procedures for New 2001 and Later through 2006 Off-Road Large Spark-ignition Engines, Parts I and II," adopted September 1, 1999, and as last amended March 2, 2007. The test procedures for determining certification and compliance with the standards for exhaust and evaporative emissions from new model year 2007 through 2009 off-road LSI engines with engine displacement greater than 1.0 liter sold in the state are set forth in "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-ignition Engines (2007-2009 Test Procedure 1048)," adopted March 2, 2007. The test procedures for determining certification and compliance with the standards for exhaust and evaporative emissions from new model year 2010 and subsequent off-road LSI engines with engine displacement greater than 1.0 liter sold in the state are set forth in "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-ignition Engines (2010 and Later Test

Procedure 1048),” adopted March 2, 2007. The test procedures for determining compliance with the standards for exhaust and evaporative emissions for new model year 2007 and subsequent off-road LSI engines with engine displacement greater than 1.0 liter sold in the state are set forth in the “California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 and Later Off-Road Large Spark-Ignition Engines (Test Procedures 1065 and 1068)”, adopted March 2, 2007.

(d) The test procedures for determining certification and compliance with the standards for exhaust emissions from new off-road LSI engines with engine displacement equal to or less than 1.0 liter sold in the state are set forth in “California Exhaust Emission Standards and Test Procedures for 1995-2004 ~~and Later Small Off-Road Engines,~~” as last amended ~~March 23, 1999~~ July 26, 2004 or “California Exhaust Emission Standards and Test Procedures for 2005 and Later Small Off-Road Engines,” adopted July 26, 2004.

(e) ~~Replacement Engines~~ Replacement Engines.

(1) [Reserved]

(2) (A) Beginning in 2004, a new off-road large spark-ignition engine intended solely to replace an engine in a piece of off-road equipment that was originally produced with an engine manufactured prior to the applicable implementation date as described in paragraph (b), shall not be subject to the emissions requirements of paragraph (b) provided that:

(i) The engine manufacturer has ascertained that no engine produced by itself or the manufacturer of the engine that is being replaced, if different, and certified to the requirements of this article, is available with the appropriate physical or performance characteristics to repower the equipment; and

(ii) Unless an alternative control mechanism is approved in advance by the Executive Officer, the engine manufacturer or its agent takes ownership and possession of the engine being replaced; and

(iii) The replacement engine is clearly labeled with the following language, or similar alternate language approved in advance by the Executive Officer:

THIS ENGINE DOES NOT COMPLY WITH CALIFORNIA OFF-ROAD OR ON-HIGHWAY EMISSION REQUIREMENTS. SALE OR INSTALLATION OF THIS ENGINE FOR ANY PURPOSE OTHER THAN AS A REPLACEMENT ENGINE IN AN OFF-ROAD VEHICLE OR PIECE OF OFF-ROAD EQUIPMENT WHOSE ORIGINAL ENGINE WAS NOT CERTIFIED IS A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.

(B) At the beginning of each model year, the manufacturer of replacement engines must provide, by engine model, an estimate of the number of replacement engines it expects to produce for California for that model year.

(C) At the conclusion of the model year, the manufacturer must provide, by engine model, the actual number of replacement engines produced for California during the model year, and a description of the physical or performance characteristics of those models that indicate that certified replacement engine(s) were not available as per paragraph (A).

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153, 43154, 43205.5, and 43210, 43210.5, 43211 and 43212, Health and Safety Code.

## **2434. Emission Control Labels - 2001 and Later Off-Road Large Spark-ignition Engines**

- (a) ~~Purpose.~~ Purpose. [No Change]
- (b) ~~Applicability.~~ Applicability. [No Change]
- (c) ~~Label Content and Location.~~ Label Content and Location.
  - (1) A tune-up label made of a permanent material must be welded, riveted or otherwise permanently attached to the engine block or other major component in such a way that it will be readily visible after installation of the engine in the equipment. If the equipment obscures the label on the engine, the equipment manufacturer must attach a supplemental label such that it is readily visible.
  - (2) In selecting an acceptable location, the manufacturer must consider the possibility of accidental damage (e.g., possibility of tools or sharp instruments coming in contact with the label). Each label must be affixed in such a manner that it cannot be removed without destroying or defacing the label, and must not be affixed to any part which is likely to be replaced during the equipment's useful life. The label(s) must not be affixed to any component which is easily detached from the engine.
  - (3) In addition, an engine serial number and date of engine manufacture (month and year) must be stamped on the engine block or stamped on a metal label riveted or permanently attached to the engine block. Engine manufacturers must keep records such that the engine serial number can easily be used to determine if an engine was certified for the applicable model year. Alternative engine serial number identification methods or tracking number may be allowed with prior approval from the Executive Officer.
  - (4) The label must be in the English language and use block letters and numerals which must be of a color that contrasts with the background of the label.
  - (5) The label must contain the following information:
    - (A) The label heading must read:  
  
"Important Engine Information."

(B) Full corporate name and trademark of the manufacturer.  
(C) "THIS ENGINE IS CERTIFIED TO OPERATE ON (specify operating fuel(s))."

(D) Identification of the Exhaust Emission Control System.  
Abbreviations may be used and must conform to the nomenclature and abbreviations found in the Society of Automotive Engineers document J1930 which is incorporated by reference in Section 1977, Title 13, CCR, entitled "Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms."

(E) The maintenance specifications and adjustments recommended by the engine manufacturer, including, as applicable: spark plug gap width, valve lash, ignition timing, idle air/fuel mixture setting procedure and value (e.g., idle CO, idle speed drop), and high idle speed. These specifications must indicate the proper transmission position, (if applicable), during tune-up and what accessories, if any, should be in operation, and what systems, if any (e.g., vacuum advance, air pump), should be disconnected during the tune-up. If the manufacturer does not recommend adjustment of the foregoing specifications, the manufacturer must include in lieu of the "specifications" the single statement "No other adjustments needed." For all engines, the instructions for tune-up adjustments must be sufficiently clear on the label to preclude the need for a mechanic or equipment owner to refer to another document in order to correctly perform the adjustments.

(F) Any specific fuel or engine lubricant requirement (e.g., research octane number, engine lubricant type).

(G) An unconditional statement of compliance with the appropriate model year (for 2001-2003) or (2004 and subsequent) California regulations; for example, "This engine conforms to 2002 California regulations for off-road large spark-ignition engines and is certified to 3.0 g/bhp-hr HC+NOx and 37 g/bhp-hr CO." or "This engine conforms to 2006~~7~~ California regulations for off-road large spark-ignition engines and is certified to 0.8 g/kW-hr [0.6 g/bhp-hr] HC+NOx and 20.6 g/kW-hr [15.4 g/bhp-hr] CO."

(H) Total engine displacement (in cubic inches and/or liters) of the engine upon which the engine label is attached.

(I) The engine family identification (i.e., engine family name and manufacturer's own engine group/code).

(6) (A) The manufacturer of any engine certified with a clean fuel (i.e. natural gas) must at the time of engine manufacture, affix a permanent legible label specifying the appropriate operating fuel(s).

(B) The label must be located immediately adjacent to each fuel tank filler inlet and outside of any filler inlet compartment. It must be located so that it is readily visible to any person introducing fuel to such filler inlet; provided, however, that the Executive Officer must upon application from an engine manufacturer, approve other label locations that achieve the purpose of this paragraph. If the engine is manufactured separately from the equipment, the label must be affixed to the engine and located so that it is readily visible. Such labels must be in English and in block letters which must be of a color that contrasts with their background.

(d) through (l) [No Change]

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153, - 43154, 43205.5, and 43210, 43210.5, 43211 and 43212, Health and Safety Code.

## § 2438. In-Use Compliance Program

(a) through (d) [No Change]

(e)(1) through (e)(6) [No Change]

(e)(7) Credit Calculation.

(A) For each participating engine family, emission credits (positive or negative) are to be calculated according to the following equation and rounded, in accordance with ASTM E29-93a, to the nearest gram. ASTM E29-93a has been incorporated by reference. Consistent units are to be used throughout the equation. The following equation is used to determine the credit status for an engine family whether generating positive or negative in-use emission credits:

$$\text{Credits (grams)} = \text{SALES} \times (\text{STD} - \text{CL}) \times \text{POWER} \times \text{AF} \times \text{LF} \times \text{UL}$$

Where:

**SALES** = the number of eligible sales tracked to the point of first retail sale in the U.S. for the given engine family during the model year.

**STD** = the emission standard or family emission level in g/bhp-hr or g/kW-hr, as appropriate and as noted in California Code of Regulations, Title 13, Section 2433.

**CL** = compliance level of the in-use testing in g/bhp-hr or g/kW-hr, as appropriate and as approved by ARB.

**UL** = useful life in hours (5000 hours for engines with displacement) greater than 1.0 liter.

**Power** = the average power of an engine family in bhp or kW (sales weighted). The power of each configuration is the rated output in horsepower as determined by SAE J1349 (June 1995) or J1995 (June 1995), as applicable. These procedures have been incorporated by reference.

**LF** = Load factor; Fraction of rated engine power utilized in-use (0.32 for engines with displacement greater than 1.0 liter.

**AF** = adjustment factor for the number of tests conducted, as determined from the following table, except that when a manufacturer concedes failure before completion of testing, the adjustment factor shall be 1.0:

Number of Engines Tested	Adjustment Factor
2*, 4	0.5
6	0.75
8	0.9
10	1.0

\*Small volume manufacturer

(B) [No Change]

(e)(8) through (e)(10) [No Change]

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code. Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150, 43151, 43152, 43153, 43154, 43205.5, and 43210, 43210.5, 43211 and 43212, Health and Safety Code.